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ABSTRACT

The purpose of the Commons Game is to teach students how social traps work; that is, that short-term individual gain tends to dominate long-term collective gain. Simulations of Commons Dilemma have grown considerably in the last decade; however, the research has used small face-to-face groups to study behavior in the Commons. To compare the choices individuals make in large, indeterminant sized groups with those made in small face-to-face groups, 105 college students initially played a 1-trial dilemma game. Subsequently, groups of seven students either played a 75-trial Commons Game or discussed their options for 10 minutes (to cooperate, to exploit, or to withdraw). Both groups then played the 1-trial game again, once in a large anonymous group and once in their small face-to-face group. Half the players in each condition could fine others for exploitation. An analysis of the results showed that players chose differently in a Commons Dilemma depending upon the size of the referent group in which the choices were made. Players chose the withdrawal option at a high level in the large group but rarely in the small group, suggesting that cooperation, greed, and the desire not to be a sucker operate in the large group, but only the first two operate in the small group. The possibility of being fined for defection did not deter exploitation nor increase cooperation prior to playing the game. After the game or small group discussion, the possibility of being fined did make a difference, suggesting that to be effective fines must be experienced or talked about with others. Finally, subjects who played the game made fewer cooperative choices and more withdrawal responses in the large referent group than those who did not play the game. (BL)

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Commons Dilemma Choices in Small vs. Large groups

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and

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Presented at 91st Annual Convention of the
American Psychological Association at
Anaheim, CA, August 1983

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Abstract

Introductory psychology students first played a one-trial dilemma game then groups of 7 either played a 75-trial commons game or discussed their options for 10 minutes. Both groups then played the one-trial game again once in a large anonomyous group and once in their small face-to-face group. Half the players in each condition could fine others for exploitation.

Players choose the withdrawal option at a high level in the large group but rarely in the small group. These results suggest that cooperation, greed, and the desire not to be a sucker operate in the large group, but only the first two operate in the small group. Since common dilemma research has used only small groups, the results of previous research appears restricted to small group dilemmas.

Simulations of commons dilemma have grown considerably in the last decade (Brechner, 1977; Dawes, 1980; Edney & Harper, 1978; Linder, 1982; Stern, 1976) but all of this research has used small face-to-face groups to study behavior in the commons. The problem with this research is that real-world commons are much larger than the groups used in the laboratory. The communication that can occur in small groups, which has typically increased cooperation in the laboratory, simply is not possible with the larger collectivities that make up the many commons in the real world. Thus, the results obtained to date may not be representative of what people in larger groups do when faced with a commons dilemma. Orbell and Dawes (1981) recognize this point as well and state,

> "Generally, the results of the experimental research to date can be said to suggest some hypotheses for the resolution of small-group dilemmas clearly an important subject. But the resolution of large-group dilemmas remains the province of theoretical work and is largely untouched by empirical findings" (p. 62).

Thus, the present study was done to answer the question: Do people make the same choices in a commons dilemma in small face-to-face groups as they do in large, indeterminant-sized groups?

Since we have been developing a simulation of the commons over the last few years, we were also interested in evaluating what subjects learned by playing the simulation. Additionally, we were interested in the role of fines in decreasing exploitation and/or increasing cooperation since the effects of fines have not been systematically examined.

Method

Subjects

Of the 167 students in Psychology 101 who took the pretest, 105 volunteered to participate in the commons dilemna research. Students could

earn up to 10% of the points necessary for an "A" for their participation. Five of the students played the game twice and the data from these subjects were excluded from the analysis of the results.

Procedure

The design was a 2 x 2 with fines vs. no fines as one independent variable and game vs. no-game as the second independent variable. There were two dependent variables: The choice to cooperate, exploit, or withdraw from the commons when the referent group was a 7-person face-to-face group; and the choice to cooperate, exploit, or withdraw from the commons when the referent group was a large, indeterminant, group.

During the first week of class all the students in attendance that day were given a one-trial commons game (pretest) with payoffs as shown in Table 1. Approximately one-half the class played the game with a fine option, and

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Insert Table I about here

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half played without the fine option. After this week, seven students from either the fine or no-fine condition could volunteer for the commons dilemna conditions and when they showed up to the research room, they were randomly assigned to either a game or no-game condition. Groups assigned to the game conditon played the 75 trial Commons game which lasted approximately 90 min. Immediately following the Commons game, the group was given the one-trial game (Table 1) and informed that were playing this game wi those students who had participated or would participate in their condition that quarter, possibly 40 to 50 students. After the subjects understood who they were playing with, they were allowed 10 minutes to discuss what they would like to do and then they made their choices in private. After completing this first post-test,

they were given an identical form and told th this time they would be playing only with the persons in their 7-person group. Again they were given 10 minutes to discuss their options before making their choices in private. After these latter forms were collected, the subjects were informed of how the group played in the small referent group, and the number of points earned by each choice.

Subjects in the no-game conditon played the one-trial game in the large and small referent groups without playing the 75 trial Commons game. Since the subjects in the game condition could earn class points by playing in the Commons game, those subjects in the no-game condition were given an additional 10 class points to help equate the earnings of the subjects in the two game conditions.

Description of the Commons game[1].

The purpose of the Commons game is to teach students how social traps work, that is, that short-term individual gain tends to dominate long-term collective gain. Players were given five colored cards which represented one of the five options available for a trial: red (moderate "take", cooperation); green, (maximum "take", exploitation); yellow (fixed payoff, withdrawal from the commons); black (fines green for exploitation); orange (rewards red for cooperation). Players made their choices in private and the experimenter walked around the group calling out the collective play and the points earned or lost that trial. A payoff matrix for the red and green choices (See Table 2) was displayed on a flipchart in the front of the room

[1]A manual describing the game procedures in detail is available from the senior author for $6.00.

along with a pegboard which allowed players to see advances and declines in the payoff matrix.

Insert Table 2 about here

The payoff matrix would improve if the majority of players played red and worsened if the majority played green which simulated the fluctuations in a commons resource such as the fish in the ocean which decline if fishermen attempt to maximum their harvest over an extended period and increase or maintain their population levels if the fishermen's harvest is moderate.

Players were informed that the only choice which would lower the peg on the pegboard was green and that periodically, at random intervals, the peg on the pegboard would move up a few spaces. If the peg continued to move up, the payoff matrix would improve. They were also provided with an analogy to the fish in the ocean and informed that if their collective "take" was moderate, there would be plenty of points in the point resource to last the lifetime of the game.

During the first 25 trials, communication among players was not allowed. After 25 trials, players were allowed to confer for two minutes every five trials if the majority voted to have one.

Results

Figure 1 shows the percentage of subjects making one of the four choices available on the posttest in the large referent group (hatched bars) and in the small referent group (open bars). It is clear from this figure that both cooperation and defection were greater in the small face-to-face group than in the large referent group. One-fourth of the choices in the large referent

group were yellow (withdrawal responses) while only one subject choose yellow in the small referent group. A chi square test showed that the changes from the large to the small referent group were not independent (chi square = 9.94, 2df, P < .01).

Insert Figure 1 about here

Figure 2 shows the percentage of subjects choosing cooperation (red), exploitation (green), or withdrawal (yellow) in the fine and no fine conditions for both the pre-and posttest. The possibility of being fined for defection made little difference among the choices in the pretest (Chi square = .71, 2df, P = NS) but did increase cooperation and decrease the withdrawal responses in the posttest (chi square = 14.24, 2df, P = < .001).

Insert Figure 2 about here

Figure 3 shows the percentage of subjects in the game condition and the small group discussion condition making one of the four choices in the large referent group. Those with experience playing the game made fewer cooperative but more withdrawal responses than those who did not play in the game. Additionally, the only black choices were made by subjects who had played in the game. The differences in the frequency of choices between the game and no-game conditions were statistically significant (Chi Square = 11.63, 2 df, P < .01).

Insert Figure 3 about here

Discussion

Perhaps the most important finding of this research is that players choose differently in a commons dilemma depending upon the size of the referent group in which the choices were made. Recent research by economists and political scientists (Simmons, Dawes & Orbell, note 1) which demonstrated that greed and cooperation were the only motives operating in commons dilemmas appears limited to situations where subjects make their choices in small face-to-face groups. All of the commons dilemma research we are aware of has used small face-to-face groups to test hypotheses about behavior in a commons. However, since most real-world commons dilemmas involve large groups who can not meet in face-to-face groups, the previous research has very limited generality for real-world commons dilemmas.

Additionally, it seems imperative that an withdrawal option (yellow in our game) be provided in games/simulations of the commons. This choice allows players an option who do not completely trust others in the commons but who do not wish to hurt others by exploiting the commons. Previous research has most likely inflated both cooperation and defection scores in commons dilemmas because without the withdrawal option the choice to defect consists of at least two motives: greed, and the desire not to be taken for a sucker.

The results with respect to fines replicates our finding in the previous academic year and suggests that the possibility of being fined for defection does not deter exploitation nor increase cooperation prior to playing the comm game, or having an opportunity to discuss one's options in a small group. After the game or small group discussion, though, the possibility of being fined does make a difference. This suggests that fines, to be effective, must be experienced or, at least, be talked about with others. Fines were only imposed by players with game experience and only in the large referent group.

Further, only in the large referent group did the possibility of being fined alter the distribution of choices. It is not clear why fines were not used nor why the threat of fines was ineffective in altering the choices in the small referent group.

Finally, subjects who played the game made fewer cooperative choices and more withdrawal responses in the large referent group than those who did not play the game. Perhaps the game made salient the difficulty of reaching a cooperative solution in commons dilemmas where large numbers of individuals participate in the commons. It is notewrothy, though, that the game experience did not result in more defection than the no-game condition. Rather, players with game experience choose the withdrawal option. This was a realistic choice based on their experience in the game in which the point resource was typically close to being exhausted before players reached an agreement (sometimes) to conserve their take.

Reference Note

1. Simmons, R. T., Dawes, R.M., and Orbell, J.M. Greed, Fear, and defection in Social Dilemma situations. (Manuscript submitted for publication, 1982).

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Table I

The payoff structure of the one-trial game. The black choice was available for approximately half the subjects in the study.

Play		Pay (Class Points)	
Red	Green	Red	Green
All Red	0	12	-
All Red but 1	1	10	20
All Red but 2	2	8	16
All Red but 3	3	6	12
All Red but 4 or >	4 or >	1	2

Yellow = Earns 3 points and does not effect payoffs for Red or Green.

[Black = Earns nothing but causes any Green to lose 3 points.]

Choose one:

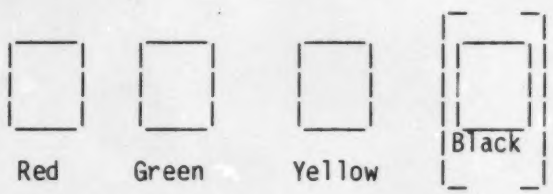

Table II

0 payoff matrix for 7 players in the Commons-Dilemma game.

Play		Pay (game points)	
Red	Green	Red	Green
0	7	-	100
1-2	6-5	40	102
3	4	42	104
4	3	44	106
5	2	46	108
6	1	48	110
7	0	50	-

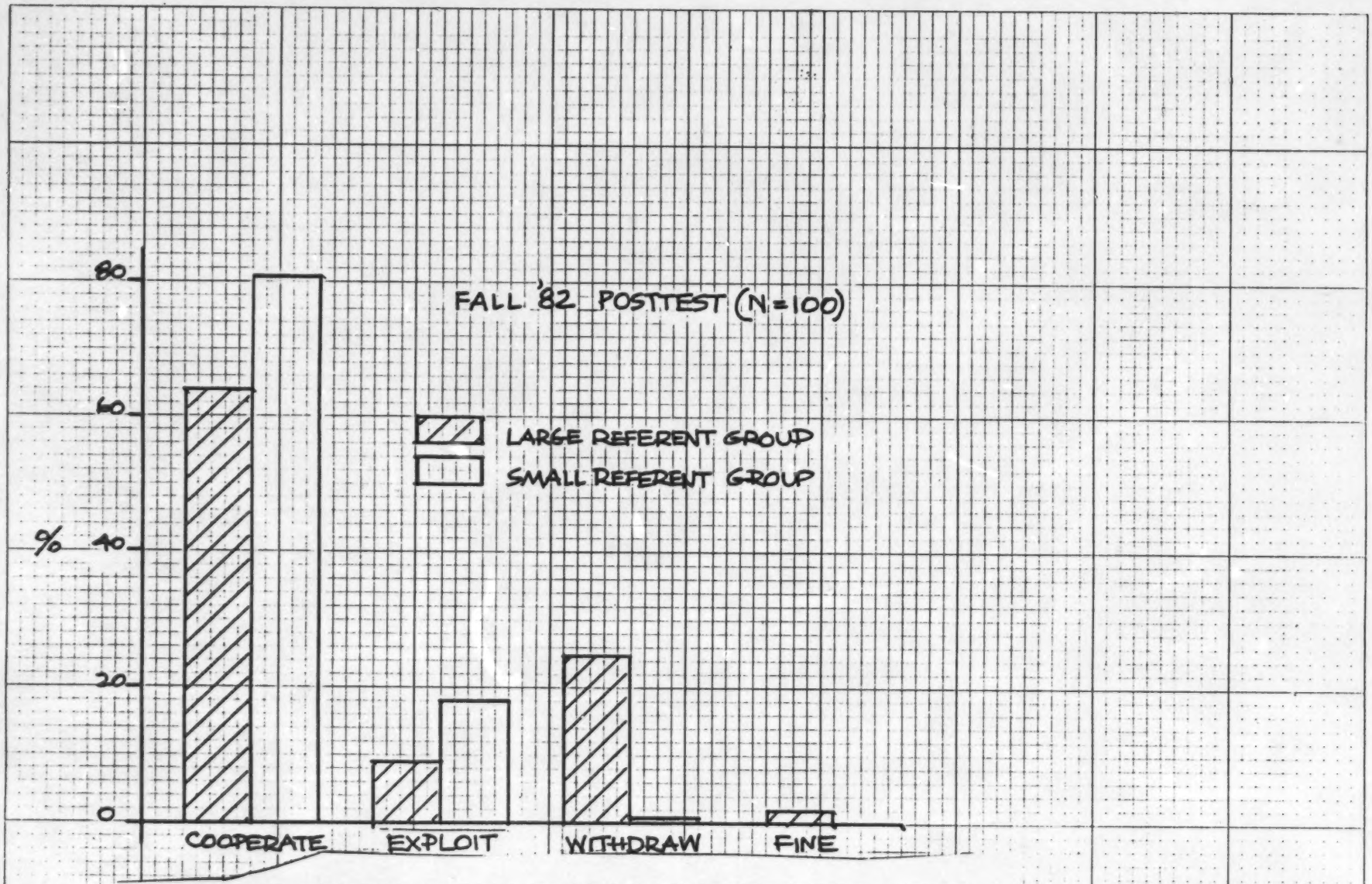

FIGURE 1. THE PERCENT OF SUBJECTS CHOOSING TO COOPERATE, EXPLOIT, WITHDRAW, OR IMPOSE A FINE IN THE LARGE REFERENT GROUP (HATCHED BARS) AND IN THE SMALL REFERENT GROUP (OPEN BARS).

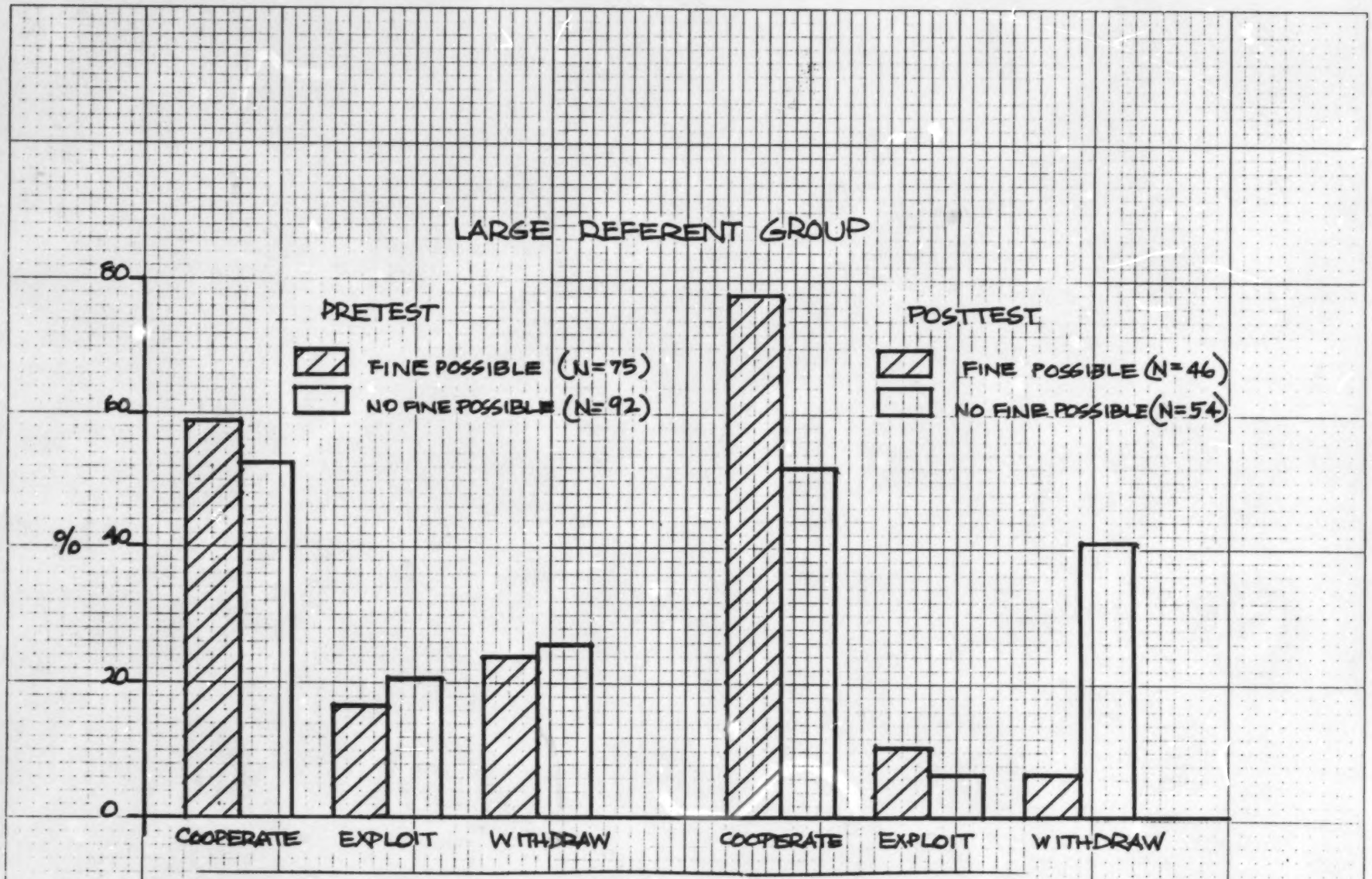

FIGURE 2. THE PERCENT OF SUBJECTS CHOOSING TO COOPERATE, EXPLOIT, OR WITHDRAW IN THE PRETEST AND POSTTEST WHEN THE REFERENT GROUP WAS LARGE. FINES (HATCHED BARS) COULD BE IMPOSED BY ABOUT HALF THE SUBJECTS IN BOTH THE PRE- AND POSTTEST.

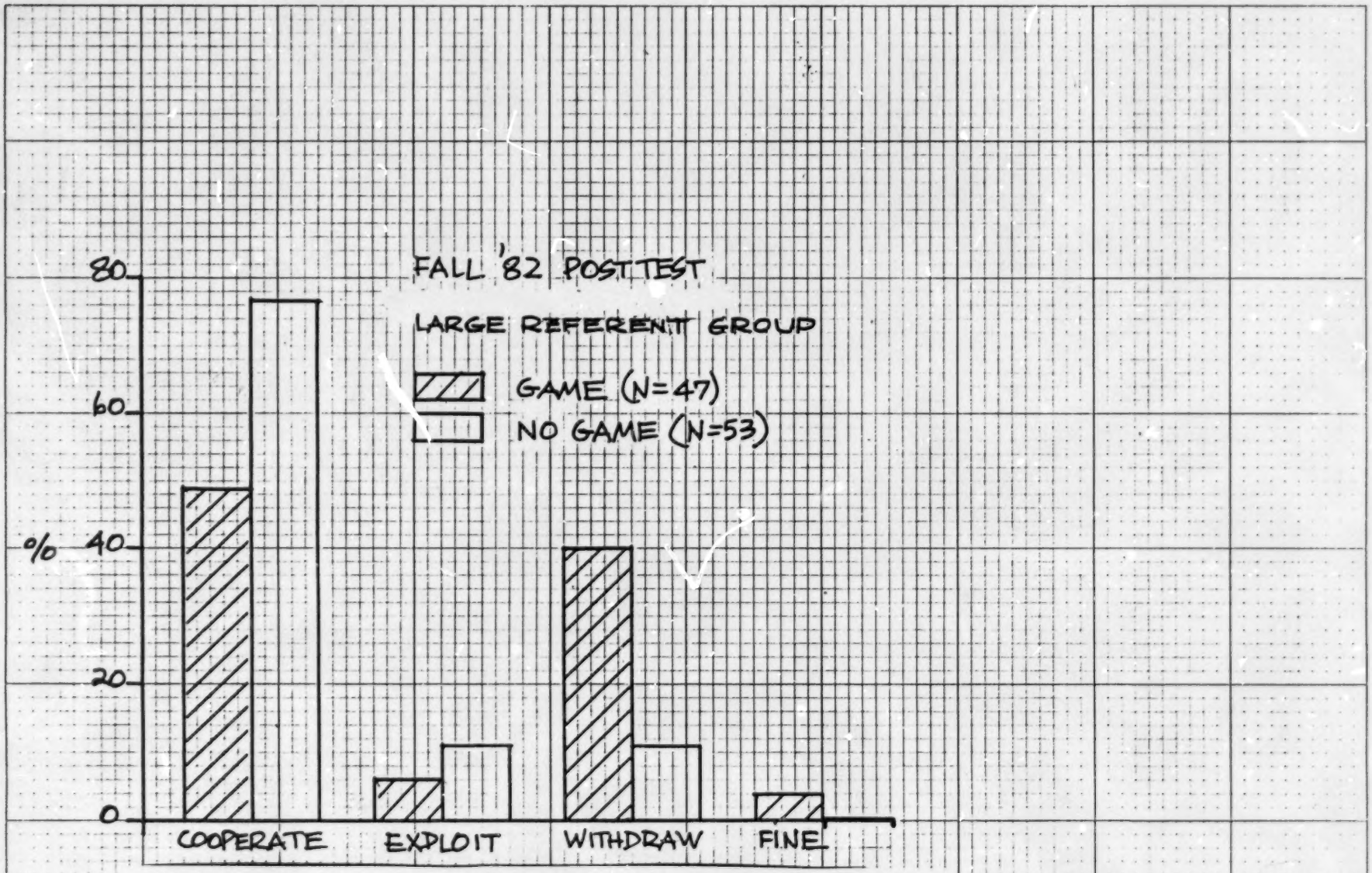

FIGURE 3. THE PERCENT OF SUBJECTS CHOOSING TO COOPERATE, EXPLOIT, WITHDRAW, OR IMPOSE A FINE FOR THOSE WHO PLAYED THE COMMONS GAME (HATCHED BARS) AND THOSE WHO DID NOT (OPEN BARS).